Space Weather Forecast

Issued on Thursday, 16 March 2023 at 01:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Chance of G1-G2/Minor-Moderate Geomagnetic storms from further glancing Coronal Mass Ejections (CMEs) on Day 1 (16 March).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Very Low to Low over the past 24 hours with just an isolated C-class flare at 15/0630UTC from AR3254. There are currently eight numbered sunspot regions on the visible disc. These are a mixture of mature spots and some more recently emerged spot groups. All are small and magnetically simple, and either stable or in decay. Some minor new un-numbered spots have emerged in the northwest and southeast of the disc
No Earth directed CME's have been observed in the past 24 hours.

Solar Wind / Geomagnetic Activity: Solar wind increases reflected the arrival of a coronal mass ejection around 15/0350UTC, with speeds observed rising sharply to Elevated levels. Winds then gradually declined to Slightly Elevated levels, before rising again to Elevated levels in recent hours. The magnetic field strength was often moderate, increasing sharply around 15/0400UTC to strong. Strong levels continued to around 15/0800UTC. The important north-south component fluctuated north/south with moderate strength, with occasional strong peaks between 15/0300-0600UTC and a sustained period of negative orientation was observed 15/0800-2130 UTC. Geomagnetic activity ranged Quiet to G2/Moderate Storm, with a G1/Minor Storm interval observed at 15/0300-0600UTC, and G2/Moderate Storm interval observed at 15/2100-2400UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) started above the S1 level, likely due to the ongoing effects from the significant far-sided eruption early on 13 March. Levels dropped below the S1 threshold around 15/0600UTC and have since been on a downward trajectory.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to continue Low or Very Low, with a slight chance of an isolated Moderate-class flare.

Solar Wind / Geomagnetic Activity: Further CME glances are possible on Day 1 (16 Mar) from the combined influence of filament eruption CMEs which left the Sun on 12 and 13 Mar, although these CMEs are expected to pass largely north and ahead of Earth.
Solar winds are expected to vary between slightly elevated and elevated levels through Day 1, with coronal hole high speed stream effects combined with any further CME influence. Winds are expected to gradually decline into Day 2 (17 Mar), although perhaps remaining at slightly elevated levels throughout much of the rest of the period, with some further weak enhancement possible by the end of Day 4 (19th) from another coronal hole.
Geomagnetic activity most likely fluctuating between Unsettled to Active on Day 1 (16 March), with a chance of reaching G1/G2 Minor/Moderate storm due to potential combined coronal hole fast winds and CME effects. Activity should then gradually ease to mainly Quiet by Day 2 and 3 (17 and 18 Mar), with a possible further upturn in activity to Unsettled to Active by the end of the period.

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Energetic Particles / Solar Radiation: The count rate of energetic particles is currently below S1/Minor storm levels, although slightly elevated above background levels. No further significant enhancements are expected at present.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	50	10	1	10
Strong	G3	No	5	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	5	10	10
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	10	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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